IREC INTERSTATE RENEWABLE ENERGY COUNCIL

Solar Workforce Development: Jobs & Training Trends

Jane M. Weissman, Executive Director
Interstate Renewable Energy Council
Vice-Chair, NABCEP
jane@irecusa.org

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Celebrating 26 years in Renewable Energy
IREC INTERSTATE RENEWABLE ENERGY COUNCIL

Jobs at all levels are on the increase

- Installers
- Sales Representatives
- Designers/Engineers
- Manufacturing personnel
- R&D Scientists
- Marketing
- Finance
- Policy & Program Managers

2007 Report from ASES

Renewable Energy and Energy Efficiency: Economic Driver for the 21st Century

- In 2006, there were 450,000 jobs in renewable energy throughout the US
- 196,000 direct jobs
- 256,000 indirect ones

Download the report at ***www.ases.org***

Snapshot

- 137 jobs from a variety of on-line renewable job listings over last few months

Job Classification	
Technical - Engineer	26%
Sales - Marketing	24%
Admin - Management	23%
Installation - Design	28%

Source: Liz Merry, Verve Solar Consulting

As the solar market matures

- Moving from DIY to skilled trade work governed by state licensing laws
- Moving from small residential systems to larger, commercial ones
- Moving from “one guy does all” to differentiation in job categories

Workforce Challenges

- 2 out of 3 employers have difficulty finding entry-level employees
- 3 out of 4 employers have difficulty finding experienced employees

Source: California's Solar Industry Workforce Study, March 2008

Installation Related Solar Jobs

- Entry-Level Solar Electric Installer
- Solar Energy System Installer
- Solar Energy Foreman
- Solar Installation Operation Manager
- Solar Energy Engineer/Designers

Types of Training

Consumers/General Public	Workshops, seminars – ½ day – 1 day
Code Officials	Workshops – ½ day – 1 day
Career Interest	Entry Level Course – baseline knowledge but doesn't qualify to install - semester-long course
Solar Installation Courses	Stand-alone courses, continuing education (non-credit) courses, new energy certificates, associate degree programs
Apprenticeship upgrade	NJATC/JATC

Training – catching up with market needs

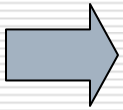
- Training infrastructure for some solar occupations are reasonably well-developed in the US but too limited
  - Dedicated solar training centers (FSEC, SEI, NCSC, MREA, GLREA, etc.)
  - Community Colleges (Lane, HVCC, CCCC, ACC, SUNY Delhi, Madison Area, etc.)
  - NJATC and Local JATCs

Training Trends

- Community Colleges and Technical Schools (high schools) are offering Renewable Energy Courses
  - Cape Cod Community College along with Upper Cape Technical and Cape Cod Technical High Schools
- Range from stand-alone courses, new energy certificates, associate degree programs
  - Lane Community College integrates a RE concentration within a 2-yr energy management degree program

Trends

- Incorporating renewable and alternative energy technology into existing trade programs



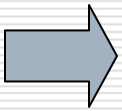
- HVCC - PV courses are part of the Electrical Construction and Maintenance Program
- SUNY Delhi – PV as part of its existing curriculum in Electrical Construction and Maintenance

Trends

- Classes are expanding from 3 to 5 day workshops to semester-long courses.

Trends

- Combining on-line with in-classroom training



- Madison Area Technical College's Consortium for Education in Renewable Energy Technology (MATC CERET)

Raising the bar for Solar Installers

North American Board of Certified Energy Practitioners (NABCEP)

The only credentialing body in the US that offers a third-party assessment of renewable energy practitioners

Professional Credentials

- Solar Electric (PV) Installer Certification
- Solar Thermal Installer Certification
- Small Wind Installer Certification – *under development*

Certificant Pool

- PV Installer Certification
  - Started in 2003
  - As of today, *421 candidates have become certified
  - 2 Exams per year
- Solar Thermal Certification
  - Started in 2006
  - As of today, *56 Certificants
  - 2 Exams per year

* **Results of March 15, 2008 exam are not in yet.**

NABCEP's Certificant Pool

Region	% of Pool
California	36%
Northeast	17%
Mid Atlantic	8%
Midwest	10%
South	8%
West	16%
Northwest	3%

As of 12/07

Requirements

- Combination of experience and/or education is required to sit for exam
- Experience needs to include installations in a responsible role on the job
- Rigorous 4-hour test of knowledge and skills based on psychometric principles
- Signed Code of Ethics

- The NABCEP credential is not a license to engage in the practice of electrical contracting, or any other form of construction contracting in any state or local jurisdiction
- Local construction or licensing boards may recognize the NABCEP credential in addition to other requirements

NABCEP has been awarded ANSI/ISO/IEC 17024 Accreditation

New York Study

NABCEP-certified installers had fewer problems at time of system inspection than those of non-certified installers.

Source: PV Workforce Development and the Market for Customer-Sited PV. McRae et al. ASES 2008 Proceedings

Survey

Installers cited credibility as the primary benefit of NABCEP.

Recognition and differentiation from competitors were also noted often.

Source: Think Energy Survey, December 2007

NABCEP's PV Entry Level Certificate

- An assessment-based certificate program – course provides instruction and at completion, an exam is administered
- Demonstrates basic knowledge, comprehension and application of key terms and concepts of PV systems
- Course is tied to specific learning objectives

NABCEP's Entry Level…

- Certificate by itself does not qualify an individual to install PV systems
- Brings new installers into the pipeline
- 34 Providers offering the Certificate

What about the training?

Are we teaching the right skill sets?

IREC is the **North American Licensee** for the Institute for Sustainable Power's Quality (ISPQ) International Standard #01021 for Renewable Energy Training Accreditation and Instructor Certification programs

5 ISPQ designations

1. Accreditation for Training Programs
2. Accreditation for Continuing Education Providers
3. Certification for Independent Master Trainers
4. Certification for Affiliated Master Trainers
5. Certification for Instructors

Using the ISPQ International Standard as a guide, candidates need to show that the information they teach covers the full range of information required for a given subject.

The ISPQ Standard also describes the ethical and practical requirements and also outlines requirements for quality program management and administration.

Recommended Criteria

- Practitioner training courses should lead to defined workplace knowledge, skills, and abilities.
- Training should address issues of safety, codes, and core competencies.
- Training should be taught in an environment with appropriate facilities, tools, and safe practices.
- Training should offer a formal and planned learning structure where the learner receives some sort of feedback and the learner's progress is monitored.
- Instructors have to be qualified in content and teaching.

Task Analysis

- The task (or job) analysis is a formal process for determining what people do, under what working conditions they do it, what they must know to do it, and the skills they must have to do it.
- Technical committee of subject matter experts is convened to develop the task analysis.

NABCEP's PV Installer Task Analysis

- Purpose is to define a standard set of competencies required of contractors who install grid-connected PV systems.

1. Working safely with PV systems
2. Conducting a site assessment
3. Selecting a system design
4. Adapting the mechanical design
5. Adapting the electrical design
6. Installing subsystems and components at the site
7. Performing a system checkout and inspection
8. Maintaining and troubleshooting a system

NABCEP = North American Board of Certified Energy Practitioners

NABCEP's TAs

- PV Installer Task Analysis
  - 8 Main Tasks
  - 58 Subtasks
- Solar Thermal Installer Task Analysis
  - 12 Main Tasks
  - 129 Subtasks
- Small Wind Installer Task Analysis
  - 8 Main Tasks
  - 93 Subtasks

All available at **www.nabcep.org**

Other Recommendations for Training

- Conduct a skills assessment by surveying local business, industry and government representatives
- Curriculum needs to include real-world preparation
- Make sure prerequisites have been established for each course or program

- Student's performance should be evaluated by written exams or other assessment methods
- Develop alliances and establish an active advisory committee with business and industry
- Establish partners for articulation and develop articulation agreements with technical high schools, community colleges, and four-year degree colleges and universities

Contact info

www.irecusa.org

Jane Weissman at IREC
jane@irecusa.org